WHAT IS CLAIMED IS:

1. A method for applying a Multi-Protocol Label Switching (MPLS) network to support Quality of Service (QoS) in General Packet Radio Service (GPRS), the MPLS including multiple Label Switch Routers (LSRs) for providing Label Switch Paths (LSPs) established by label stack, the MPLS network defining level 1 label and level 2 label, wherein a level 1 LSP is formed by switching multiple level 1 labels while a level 2 LSP is formed by switching multiple level 2 labels, and the level 1 label of the label stack is used to address routing LSP outside the GPRS core network while the level 2 label of label stack is used to address routing LSP inside the GRPS core network, the packet switching network being connected to at least one Corresponding Node (CN), the GPRS core network including at least one Gateway GPRS Support Node (GGSN) connected to the packet switching network and multiple Serving GPRS Support Nodes (SGSNs), each SGSN connected to base stations (BSs) of at least one wireless access network, the method comprising the steps of:

(A) pre-configuring level 2 LSP connections with reserved bandwidth respectively between Gateway GPRS Support Node (GGSN) and each Service GPRS Support Node (SGSN), and between two SGSNs, thereby forming level 2 LSP tunnels with multiple fixed paths;

(B) establishing level 1 LSPs on-demand from a corresponding node (CN) to a mobile station (MS), wherein the SGSN establishes a first mapping table for recording relation between MID label and IMSI and NSAPI for MSs when the level 1 LSP is established, and the SGSN

accordingly recognizes and locates the MS; and

(C) forwarding a packet between the CN and the MS according to the level 1 LSP, wherein when the packet is forwarded to the SGSN, the SGSN finds corresponding IMSI and NSAPI from the first mapping table with reference to the MID label for addressing the MS's location.

2. The method as claimed in claim 1, wherein the level 1 LSP is L-LSP (Label-Only-Inferred-PSC LSP) to support one QoS (Quality of Service) class while level 2 LSP is E-LSP (EXP-Inferred-PSC LSP) to concurrently support various QoS classes.

3. The method as claimed in claim 2, wherein in step (B), the level 1 LSP is established by following steps:

(B1) an ingress LSR of CN using the MS's home IP address prefix as Forwarding Equivalent Class (FEC), and establishing an L-LSP tunnel to the GGSN;

(B2) the ingress LSR sending a label request to the GGSN when the L-LSP tunnel is establishing, and the GGSN finding all MSs with IP prefixes met with the FEC from the GGSN's PDP context and further sending remote label request to corresponding SGSN by applying each MS's local IP as an FEC;

(B3) the SGSN retrieving the FEC from the remote label request when the SGSN receives the remote label request sent by the GGSN, reserving an MID label for the FEC to response to GGSN 31, and searching corresponding PDP context based on the FEC to obtain the MS's IMSI and NSAPI and accordingly establish relation between the MID label and the

IMSI and NSAPI for being recorded in the first mapping table;

(B4) the GGSN reserving a level 1 label to response to upstream LSR and recording the same in an ILM (Incoming Label Mapping) mapping table as soon as the GGSN receives any label response sent by the SGSN, and thus completing establishment of level 1 L-LSP; and

(B5) the GGSN 31 creating an individual FTN (FEC to Next Hop Label Forwarding Entry) for every label response sent by the SGSN, and also completing establishment of remote level 1 L-LSP.

4. The method as claimed in claim 2, wherein step (C) further comprises:

(C1) sending data packets to the level 1 LSP (L-LSP) via the ingress LSR of CN for reaching the GGSN;

(C2) searching the ILM mapping table when the GGSN receives a labeled packet sent by upstream LSR, popping label and sending the same to IP layer for further processing;

(C3) using the MS's local IP address as the FEC to search corresponding FTN when the GGSN's IP layer sees destination location, and adding the MID label and level 2 label in front of IP header according to the result of searching FTN; and

(C4) the GGSN forwarding the packet to level 2 LSP tunnel (E-LSP) between GGSN and SGSN.

5. The method as claimed in claim 4, further comprising:

(C5) SGSN popping level 1 MID label of the label packet and searching IMSI and NSAPI corresponding to the MS in the first mapping

table using the level 1 MID label to forward the data packet to corresponding MS via the wireless access network.

6. The method as claimed in claim 5, wherein the level 1 MID label is a global unique identify.

7. The method as claimed in claim 5, further comprising an inter-SGSN handoff procedure for allowing the MS to move from a first SGSN to an area controlled by a second SGSN, the inter-SGSN handoff procedure comprising following steps:

(D1) sending an SGSN context request from the second SGSN to the first SGSN for requesting the MID label of the MS after handoff entrance;

(D2) establishing corresponding first mapping table in the second SGSN such that packet can be forwarded from the first SGSN to the second SGSN via level 2 LSP tunnel pre-configured; and

(D3) updating the MS's PDP context and level 2 LSP label when the GGSN receives update PDP context request sent by the second SGSN, so that the level 1 LSP can be forwarded from GGSN to the second SGSN via the level 2 LSP tunnel.

8. The method as claimed in claim 2, wherein each L-LSP bandwidth depends on total required bandwidth on-demand.

9. The method as claimed in claim 2, wherein each E-LSP bandwidth is pre-reserved as a constant.

10. The method as claimed in claim 9, wherein the bandwidth requirement of each E-LSP is determined accordingly varied with quantity

of L-LSPs and desired QoS of each L-LSP passing through the corresponding E-LSP, and the bandwidth reservation is dynamically adjusted according to the total bandwidth requirement of all L-LSPs passing through.

11. The method as claimed in claim 7, wherein the E-LSP only forwards MS's packets on handoff, which performs a handoff between SGSNs to assure that the MS has QoS guarantee during handoff, and the E-LSP's bandwidth reservation is static.

12. The method as claimed in claim 11, wherein the E-LSP's bandwidth reservation is calculated based on the inter-SGSN handoff rate of MSs between two specific SGSNs.

13. A system for applying a Multi-Protocol Label Switching (MPLS) network to support Quality of Service (QoS) in General Packet Radio Service (GPRS), the MPLS network including multiple Label Switch Routers (LSRs) for providing Label Switch Paths (LSPs) established by label stack, the MPLS network defining level 1 label and level 2 label, wherein a level 1 LSP is formed by switching multiple level 1 labels while a level 2 LSP is formed by switching multiple level 2 labels, the system comprising:

at least one wireless access network;

a packet switching network constructed by the MPLS network and connected to at least one corresponding node (CN); and

a GPRS core network constructed by the MPLS network, including:

at least one Gateway GPRS Support Node (GGSN) connected to the

packet switching network; and

multiple Serving GPRS Support Nodes (SGSNs), each SGSN connected to at least one base station (BS) of the wireless access network,

wherein level 2 LSP connections with reserved bandwidth are pre-configured respectively between Gateway GPRS Support Node (GGSN) and each Service GPRS Support Node (SGSN), and between two SGSNs, thereby forming level 2 LSP tunnels with multiple fixed paths, and level 1 LSP from the corresponding node (CN) to a mobile station (MS) is established on-demand, so that the SGSNs can recognize and locate corresponding MSs.

14. The system as claimed in claim 13, wherein the level 1 LSP is L-LSP (Label-Only-Inferred-PSC LSP) to support one QoS (Quality of Service) class while level 2 LSP is E-LSP (EXP-Inferred-PSC LSP) to concurrently support various QoS classes.

15. The system as claimed in claim 14, wherein when the level 1 LSP is established, the SGSN establishes a first mapping table to record relation between the MID label and the IMSI and NSAPI for MSs while the GGSN establishes an FTN mapping table to record relation between IP address of MS and MID label of MS, and between IP address of MS and level 2 label.

16. The system as claimed in claim 15, wherein the level 1 MID label is global unique identify.